

Amendments to the Claims

Please amend the claims as follows:

1. (currently amended) A semiconductor device comprising:
a substrate; and
a plurality of molded plastic stiffener components attached to a first surface of the substrate without an adhesive element and comprising at least one cross member, the stiffener components effective to increase rigidity of the substrate, wherein the substrate and the stiffener components are separate components that are attached and secured together.
2. (original) The device of Claim 1, wherein the substrate is selected from a group consisting of a laminated polymer, a polyimide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.
3. (original) The device of Claim 1, wherein the substrate has a thickness of less than about 75 microns.
4. (original) The device of Claim 1, wherein the substrate has a thickness of less than about 50 microns.
5. (original) The device of Claim 1, wherein the substrate has a thickness of less than about 35 microns.
6. (previously presented) The device of Claim 1, wherein the stiffeners have a thickness of less than about 100 microns.
7. (previously presented) The device of Claim 1, wherein the stiffener components have a thickness of less than about 75 microns.

8. (previously presented) The device of Claim 1, wherein the stiffener components have a thickness of less than about 50 microns.
9. (previously presented) The device of Claim 1, wherein the stiffener components comprise a thermoplastic material.
10. (previously presented) The device of Claim 1, wherein the stiffener components comprise a thermosetting polymeric material.
11. (previously presented) The device of Claim 1, wherein the thermal coefficient of expansion of the stiffener components and the substrate correspond such that heating expands both the stiffener components and the substrate approximately equally.
- 12-16. (canceled)
17. (previously presented) The device of Claim 1, wherein the stiffener components are in a form selected from the group consisting of a grid, a lattice, a grille, and a web.
- 18-20. (canceled)
21. (withdrawn) The device of Claim 1, wherein one or more of the stiffener components are structured as an enclosure for containing an encapsulating material therein.
22. (withdrawn) The device of Claim 1, wherein the substrate comprises index holes.
23. (previously presented) The device of Claim 1, wherein the substrate is in reel form.
24. (currently amended) A semiconductor device comprising:
a substrate comprising a first surface, a second surface, and a periphery; and

a plurality of molded plastic stiffener components attached to the first surface of the substrate proximate the periphery and comprising at least one cross member; the stiffener components attached to the substrate without an adhesive element, wherein the substrate and the stiffener components are separate components that are attached and secured together.

25. (withdrawn) The device of Claim 24, wherein the stiffener components protrude from the first surface of the substrate.

26. (withdrawn) The device of Claim 24, wherein the first surface of the substrate comprises a recess and the stiffener components are secured to the substrate within the recess.

27. (withdrawn) The device of Claim 26, wherein the stiffener components are about level with the first surface of the substrate.

28-33. (canceled)

34. (currently amended) A semiconductor assembly comprising:
a substrate having a first surface, a second surface, and a periphery;
a die situated on the first surface of the substrate; and
a plurality of molded plastic stiffener components attached to the first surface of the substrate without an adhesive element and comprising at least one cross member, wherein the substrate and the stiffener components are separate components that are attached and secured together.

35. (previously presented) The assembly of Claim 34, wherein the stiffener components are situated at the periphery of the substrate.

36. (withdrawn) The assembly of Claim 35, further comprising a second molded plastic stiffener component secured to the second surface of the substrate without attachment with an adhesive element.

37. (previously presented) The assembly of Claim 34, wherein the substrate is selected from a group consisting of a laminated polymer, a polyimide film, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.

38-43. (cancelled)

44. (previously presented) A method of securing a stiffener to a substrate, comprising:
applying a stiffener material onto a first surface of a substrate to form a plurality of plastic stiffeners proximate a periphery of the substrate; and
hardening the stiffener material wherein the plurality of plastic stiffeners are attached to the substrate without an adhesive element, and the substrate and the plastic stiffeners are separate components that are attached and secured together, said hardening comprising at least one of heating the stiffener material, cooling the stiffener material, curing the stiffener material by means of a catalyst, and curing the stiffener material by exposure to radiation.

45. (previously presented) The method of Claim 44, wherein applying the stiffener material comprises a molding process selected from the group consisting of transfer molding, injection molding, and spray molding.

46. (previously presented) The method of Claim 44, wherein applying the stiffener material comprises applying an encapsulating material to the substrate and molding the encapsulating material into said stiffeners.

47. (canceled)

48. (currently amended) A method of securing a stiffener to a lead frame assembly, comprising a substrate having a first surface, a second surface, and a periphery, and two or more dies situated on the first surface of the substrate; the method comprising:

molding a stiffener material onto a first surface of the substrate of the lead frame assembly to form a plurality of molded stiffeners attached to the first surface of the substrate without an adhesive element, wherein the substrate and the stiffener components are separate components that are attached and secured together;

encapsulating at least a portion of the two or more dies situated on the lead frame assembly; and

singulating the lead frame assembly having the molded stiffeners situated thereon, to separate the two or more dies.

49. (canceled)

50. (previously presented) The method of Claim 48, wherein:

the stiffener material is molded onto the substrate to provide a boundary at least partially around the dies on the substrate,

encapsulating said die comprises dispensing an encapsulating material onto the dies, and the molded stiffeners are structured to contain the encapsulating material within said boundary.

51. (withdrawn – currently amended) A method of forming a semiconductor die package, comprising:

securing a die to a first surface of a substrate;

molding a stiffener material onto said surface of the substrate to form a plurality of molded plastic stiffeners thereon such that the stiffeners are attached to the substrate without an adhesive element and comprises at least one cross member, wherein the substrate and the plastic stiffeners are separate components that are attached and secured together; and

encapsulating the die and the molded plastic stiffeners with an encapsulating material to form the semiconductor die package.

52. (withdrawn) The method of Claim 51, wherein encapsulating the die and the plastic stiffeners comprises positioning the substrate with the die and the molded plastic stiffeners situated thereon between two mold plates, and removing the package from the mold plates after the encapsulating material has hardened.

53. (withdrawn – currently amended) A method of forming a semiconductor die package, comprising:

mounting a die on a first surface of a lead frame;

molding a plurality of plastic stiffeners comprising at least one cross member onto the first surface of the lead frame such that the stiffeners are attached to the substrate without an adhesive element, wherein the substrate and the stiffeners are separate components that are attached and secured together;

applying an encapsulating material to the die and the stiffeners; and

hardening the encapsulating material to produce the semiconductor die package.

54. (canceled)

55. (currently amended) A semiconductor device, comprising:

a substrate comprising first and second surfaces, and a periphery; and

a plurality of molded thermoplastic components attached to the first surface of the substrate proximate the periphery without an adhesive element, the plurality of molded thermoplastic components structured to stiffen the substrate and comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together.

56. (currently amended) A semiconductor device, comprising:

a substrate comprising first and second surfaces, and a periphery;

a plurality of molded thermoplastic components attached to the first surface of the substrate proximate the periphery without an adhesive element, the plurality of molded

thermoplastic components structured to stiffen the substrate and comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together, and

a die mounted on the first surface of the substrate.

57. (currently amended) A semiconductor device, comprising:

a substrate comprising first and second surfaces, and a periphery;

a plurality of molded thermoset plastic components attached to the first surface of the substrate proximate the periphery without an adhesive element, the plurality of molded thermoset plastic components structured to stiffen the substrate and comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together, and

a die mounted on the first surface of the substrate.

58. (currently amended) A semiconductor device, comprising:

a substrate comprising first and second surfaces, and a periphery;

a plurality of molded thermoplastic components attached to the first surface of the substrate without an adhesive element, the plurality of molded thermoset plastic components situated proximate the periphery and structured to stiffen the substrate and comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together, and

an element situated along the periphery of the substrate and structured for engagement with a processing mechanism for transporting the substrate.

59. (previously presented) The device of Claim 58, wherein the engagement element comprises a plurality of index holes proximate the periphery of the substrate.

60. (previously presented) The device of Claim 58, wherein the substrate comprises a lead frame.

61. (currently amended) A semiconductor device, comprising:
a lead frame comprising first and second surfaces, and a periphery;
a plurality of molded thermoplastic components attached to the first surface of the lead frame along the periphery to stiffen the lead frame and comprising at least one cross member, wherein the lead frame and the stiffeners are separate components that are attached and secured together, and
a plurality of index holes proximate the periphery of the lead frame and structured for handling the lead frame by a processing mechanism.
62. (currently amended) A method of forming a semiconductor device, comprising:
molding a plastic material onto a first surface of a substrate proximate a periphery of the substrate to form a plurality of molded plastic stiffeners attached to the first surface of the substrate without an adhesive element and comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together.
63. (currently amended) A method of forming a semiconductor device, comprising:
applying a plastic material onto a first surface of a substrate proximate a periphery of the substrate by a molding process to form a plurality of stiffeners comprising at least one cross member [[thereon]]; and
hardening the plastic material on the substrate to form the stiffeners attached to the first surface of the substrate without an adhesive element, wherein the substrate and the stiffeners are separate components that are attached and secured together.
64. (previously presented) The method of Claim 63, wherein applying the stiffening material comprises a transfer molding process.
65. (previously presented) The method of Claim 63, wherein applying the plastic material comprises an injection molding process.

66. (previously presented) The method of Claim 63, wherein applying the plastic material comprises a spray molding process.
67. (previously presented) The method of Claim 63, wherein the plastic material comprises a thermoplastic material.
68. (previously presented) The method of Claim 63, wherein the plastic material comprises a thermosetting polymeric material.
69. (previously presented) The method of Claim 63, wherein hardening the plastic material comprises heating the plastic material.
70. (previously presented) The method of Claim 63, wherein hardening the plastic material comprises cooling the plastic material.
71. (previously presented) The method of Claim 63, wherein the plastic material comprises a catalyst, and hardening the plastic material comprises curing the plastic material.
72. (previously presented) The method of Claim 63, wherein hardening the plastic material comprises curing the plastic material by exposure to radiation.
73. (currently amended) A method of forming a semiconductor device, comprising:
applying a flowable plastic material onto a first surface of a substrate proximate a periphery of the substrate to form a plurality of stiffeners thereon;
hardening the plastic material on the substrate to form said plurality of stiffeners attached to the first surface of the substrate without an adhesive element, wherein the substrate and the stiffeners are separate components that are attached and secured together; [[and]]
mounting a die on the first surface of the substrate; and
encapsulating at least a portion of the die.

74. (currently amended) A method of forming a semiconductor device, comprising:
 molding a plastic material onto a first surface of a substrate proximate a periphery of the substrate to form a plurality of stiffeners;
 hardening the plastic material on the substrate to form said plurality of stiffeners attached to the substrate without an adhesive element, wherein the substrate and the stiffeners are separate components that are attached and secured together; ~~[[and]]~~
 mounting a die on the first surface of the substrate; and
encapsulating at least a portion of the die.

75. (previously presented) The method of Claim 74, wherein molding the plastic material comprises a process selected from the group consisting of transfer molding, injection molding, and spray molding.

76-84. (canceled)

85. (currently amended) A semiconductor device comprising: a plurality of molded plastic stiffeners attached to a first surface of a substrate without an adhesive element and comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together.

86. (currently amended) A semiconductor device comprising: a plurality of molded plastic stiffeners in the form of a plate attached to a first surface of a substrate without an adhesive element, said plurality of stiffeners comprising at least one cross member; wherein the substrate and the stiffeners are separate components that are attached and secured together.

87. (currently amended) A semiconductor device comprising: a plurality of molded plastic stiffeners in the form of strips attached to a first surface of a substrate without an adhesive element; said plurality of stiffeners comprising at least one cross member, wherein the substrate and the stiffeners are separate components that are attached and secured together.

88. (currently amended) A semiconductor device comprising: a substrate with a plurality of strips of a molded plastic stiffener attached to a first surface of said substrate without an adhesive element, the strips of said stiffener comprising at least one cross member; wherein the substrate and the strips of said stiffeners are separate components that are attached and secured together.

89. (currently amended) A semiconductor device comprising:
a plurality of stiffeners comprising a molded plastic stiffener component comprising at least one cross member attached to a first surface of ~~[[the]]~~ a substrate without an adhesive element, the stiffener component effective to increase rigidity of the substrate, wherein the substrate and the stiffener component are separate components that are attached and secured together.

90. (previously presented) The device of Claim 89, wherein the substrate comprises a periphery, and the stiffener component is attached proximate the periphery of the substrate.

91. (previously presented) The device of Claim 89, further comprising a second molded plastic stiffener component secured to a second surface of the substrate without attachment with an adhesive element.